1. List all the procedures in the metacircular evaluator that call \texttt{eval}.

2. List all the procedures in the metacircular evaluator that call \texttt{apply}.

3. Explain why \texttt{make-procedure} does \textit{not} call \texttt{eval}.

4. Abelson and Sussman, exercises 4.1, 4.2, 4.4, 4.5

5. In this lab exercise you will become familiar with the Logo programming language, for which you’ll be writing an interpreter in project 4.

To begin, type \texttt{logo} at the Unix shell prompt — \textbf{not} from Scheme! You should see something like this:

\texttt{Welcome to Berkeley Logo version 5.3}

\texttt{?}

The question mark is the Logo prompt, like the > in Scheme. (Later, in some of the examples below, you’ll see a > prompt from Logo, while in the middle of defining a procedure.)

5a. Type each of the following instruction lines and note the results. (A few of them will give error messages.) If you can’t make sense of a result, ask for help.


Continued on next page...
to greet :person
say [how are you,]
end
to say :saying
print sentence :saying :person
end
greet "ringo
show map "first [paperback writer]
show map [word first ? last ?] ~
     [lucy in the sky with diamonds]
to who :sent
foreach [pete roger john keith] "describe
    ;;; The following stuff will work
end
to describe :person
print se :person :sent
end
to countdown :num
    if :num=0 [print "blastoff stop"
              print :num
              countdown :num-1
    end
countdown 5
to downup :word
    print :word
    if emptyp bl :word [stop]
    downup bl :word
    print :word
end
downup "rain
to who [sells out]
print :bass
make "bass "paul
print :bass
print bass
to bass
    output [johnny cymbal]
end
to tree :size
    if :size < 3 [stop]
    fd :size/2
    lt 30 tree :size*3/4 rt 30
    fd :size/3
    rt 45 tree :size*2/3 lt 45
    fd :size/6
    bk :size
end
to countdown :num
cs pu bk 100 pd ht tree 100

5b. Devise an example that demonstrates that Logo uses dynamic scope rather than lexical scope. Your example should involve the use of a variable that would have a different value if Logo used lexical scope. Test your code with Berkeley Logo.

5c. Explain the differences and similarities among the Logo operators " (double-quote), [ ] (square brackets),
and : (colon).